

Remote Virtual Queuing/Originator Routing Control

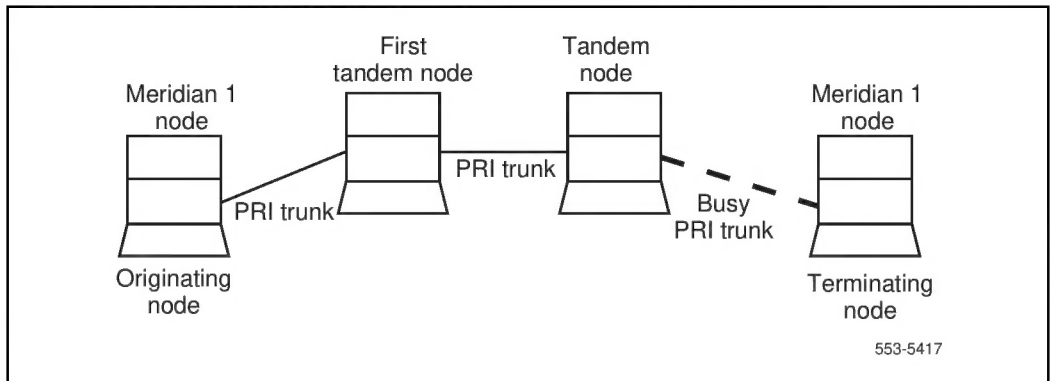
Remote Virtual Queuing

Remote Virtual Queuing (RVQ) allows you to perform queuing-type functions on a busy trunk route (B-channel) in your ISDN network. This feature is similar to the ESN features Coordinated Call Back Queuing (CCBQ) and Call Back Queuing to a Conventional Main (CBQCM). Prior to operating RVQ, you must have a working knowledge of the ESN features. Refer to *Electronic Switched Network description* (309-3001-100) for a complete description of these features.

RVQ is supported on a private ISDN PRI/ISL network only.

When an outgoing network path is unavailable, Remote Virtual Queuing (RVQ) provides call back queuing. RVQ repeatedly scans ahead on the ISDN trunk to be sure the entire path from origination to termination is available. When a path becomes idle, you are notified and can ring the path again to terminate the call.

Figure 80
Remote Virtual Queuing example



Operating parameters

In addition to the functions offered by CCBQ and CBQCM, RVQ provides the following:

- There is no limit to the number of nodes in the ISDN network that RVQ searches.
- The originating node has control of the call.
- Data terminals are supported.
- Attendants cannot activate RVQ.
- RVQ is activated only by telephones with Ring Again allowed.
- AUTHCODE is supported on the first tandem node only.
- Trunk Access codes are not supported.
- ACD DN's are supported as a terminating DN.
- Attendants are supported as terminating stations.

RVQ is supported in a private ISDN PRI/ISL network only. Any trunk other than an ISDN PRI or ISL trunk is considered a non-RVQ compatible (NRC) trunk. NRC trunks include analog trunks, T1 trunks, or public trunks. NRC also includes trunks connecting to a non-Meridian 1, non-ISDN, or pre-X11 release 18 node.

The originating, tandem, and terminating nodes must run X11 release 18 or later software, and include all the required packages (refer to "Feature packaging" on page 673 in this module).

Meridian Modular, 500/2500, SL-1, and Meridian digital telephones can activate and receive RVQ calls.

The RVQ retry timer is set for each NCOS. Setting a specific NCOS with a low retry timer searches for more connections more often. The lower the timer, the greater the chance to connect the call. Give consideration to the number of stations given an NCOS that have low RVQ retry timers. The lower the timer, the higher the number of call attempts on the network traffic.

The maximum total amount of time RVQ searches for available paths is 30 minutes. The countdown begins as soon as the originator activates the Ring Again key.

Only one RVQ Ring Again attempt per set at a time is allowed. If Ring Again is pressed again, after activating it for RVQ, the most recent number dialed is the one attempted.

RVQ does not check the terminating telephone's status. The dialed DN may be invalid or busy. Once the path is available, the RVQ call can reach the dialed DN. It is possible the dialed telephone is busy, and Network Ring Again can be used if enabled. The tone indicating the trunks are busy is a fast busy tone. A busy DN is indicated by a standard busy tone.

RVQ searches throughout Meridian 1 networks only. Off-network trunk paths cannot be checked beyond the first NRC trunk.

RVQ is a virtual queuing feature. Each RVQ call is independent of another. It does not operate by first-in, first-out policy. The first caller to initiate RVQ is not necessarily the first person connected.

It may take up to 30 seconds for notification to reach the originator. The network path is reserved while RVQ notifies the caller. In a private network, the path is reserved from the originating node to the terminating node. Otherwise the path is reserved up to the first NRC trunk.

RVQ supports Uniform Dialing Plan (UDP) and Coordinated Dialing Plan (CDP). For NRC trunks, the E.164 public numbering plan is supported.

RVQ supports only Meridian 1 machines in a private ISDN PRI/ISL network. A non-Meridian 1 machine functioning in tandem with a Meridian 1 machine is treated as a non-RVQ compatible (NRC) trunk.

RVQ supports the following trunk types:

— Private network ISDN trunks:

- tie
- COT
- Direct Outgoing Dial (DOD)
- WATS
- ISA
- FEX

— NRC trunks:

- COT
- Direct Outgoing Dial (DOD)
- WATS
- FEX
- ISA
- tie

RVQ is cancelled if the originating node system initializes.

If the originating node performs a cold start, RVQ is cancelled.

RVQ from a Conventional Main (RVQCM) requires a special configuration. See the “Feature implementation” on page 674.

With RVQ, callers cannot activate Ring Again to refuse expensive routes after the Expensive Route Warning Tone (ERWT) is given.

When using RVQ from a Conventional Main (RVQCM), the originating node seizes the same tie trunk group that was used to initiate RVQCM for the call back. Thus, these trunk groups must be two-way (incoming/outgoing) and configured for far end disconnect.

Conventional Mains must provide answer supervision on tie trunks connected to the originating node. The system must also permit transmission or repetition of telephone dial pulses for RVQCM operation. This feature cannot be used with systems that operate in senderized mode. Operation may require adjustment of the interdigit timeout on systems that employ simulated cut-through operation.

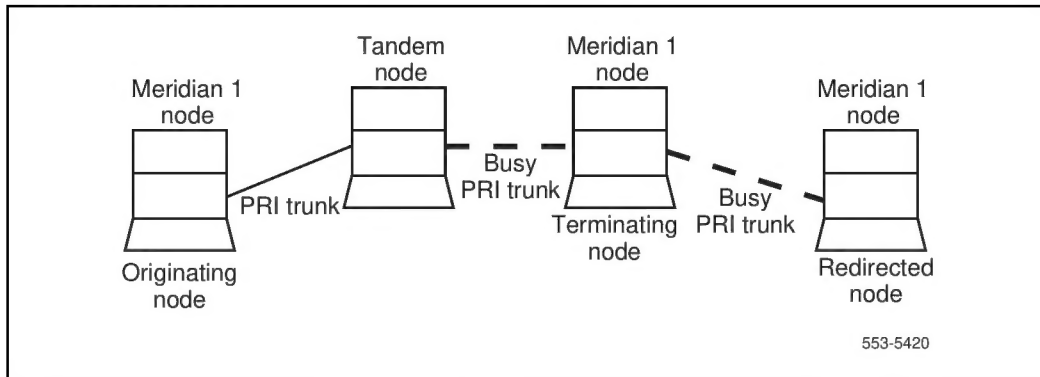
Multiple call back queues are allowed per trunk group for the Conventional Main by dialing any digits (up to seven) based on the availability of Meridian 1 call registers.

When utilizing RVQCM, do not Call Forward the calling telephone when awaiting call back. If the telephone is forwarded, it is possible that the tie trunk will not be released at the end of the call.

Feature interactions

- Coordinated Call-Back Queuing
CCBQ and RVQ can both be enabled on a single machine.
- Call Back Queuing to a Conventional Main
CBQCM and RVQ can both be enabled on a single machine.
- Direct Inward System Access
DISA DNs are not supported by RVQ.
- Make Set Busy
RVQ can be originated by and terminated on an ACD DN in Make Set Busy mode.
- Network ACD
If a target agent is available on a remote node, RVQ cannot be activated if a busy trunk is found on its way to the target node.
- Network Call Redirection
RVQ does not guarantee connection if the terminating telephone Call Forwards to a telephone on another node. When a terminating telephone Call Forwards to another node, that node is a redirected node. RVQ cannot search between terminating and redirected nodes. Figure 81 illustrates how RVQ and NCRD interact.

Figure 81
RVQ and NCRD



- Network Ring Again
Network Ring Again (NRAG) is activated only when the terminating telephone or console is busy. If both the network path and the terminating telephone are busy, RVQ is activated first. When the path is available, but the telephone is busy, then NRAG can be activated.
- Off Hook Queuing
RVQ and Off Hook Queuing (OHQ) are compatible in a system. If OHQ is configured, it is implemented by leaving the handset off hook. RVQ is implemented by pressing the Ring Again key. Choosing one or the other method activates the specified feature.

Feature operation

RVQ supports private ISDN PRI/ISL networks, non-RVQ compatible (NRC) blocked trunks, and Conventional Mains (RVQCM). RVQ supports Meridian 1 machines only. A non-Meridian 1 machine working in tandem with a Meridian 1 is treated as a non-RVQ compatible (NRC) trunk.

RVQ on a private network

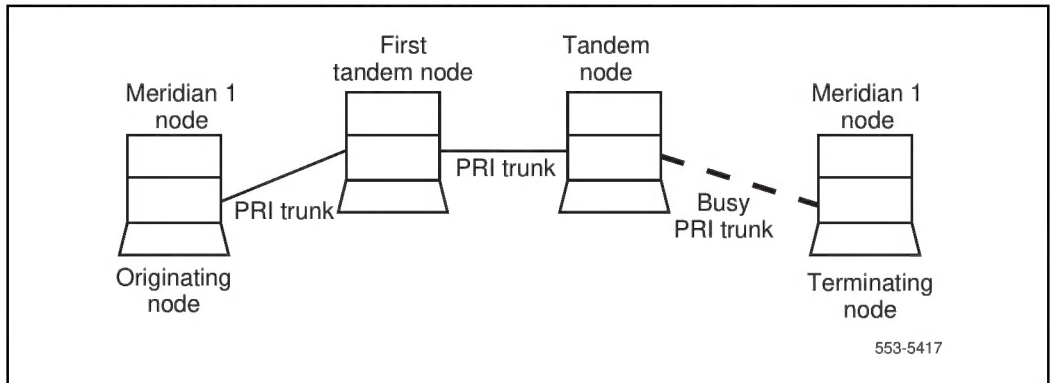
RVQ is supported for Meridian 1 machines, running X11 release 18 on an ISDN PRI/ISL network only. RVQ follows this checklist before starting:

- The first tandem node must be a Meridian 1 node, running X11 release 18 or later software.

- The Network Class of Service (NCOS) of the originating node must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block (NCTL).

Figure 82 shows RQV configured on a private network.

Figure 82
RVQ configuration example on a private network



When the checks are complete, activate RVQ by pressing the Ring Again key. As soon as the key is pressed, the retry timer begins. When the retry timer expires, RVQ checks the path again. When a blocked path occurs, RVQ searches the network to ensure that the entire path will be clear once the blockage disappears. The total amount of time RVQ will spend on a search is 30 minutes.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets.

Tandem nodes must recognize the RVQ messages and pass them on to another tandem or terminating node.

RVQ with NRC trunks

RVQ searches the path until it reaches the first non-RVQ compatible (NRC) trunk. RVQ notifies the originator when that trunk is available, but cannot search beyond it. It is possible that the path may be blocked beyond the NRC trunk, and the call cannot go through.

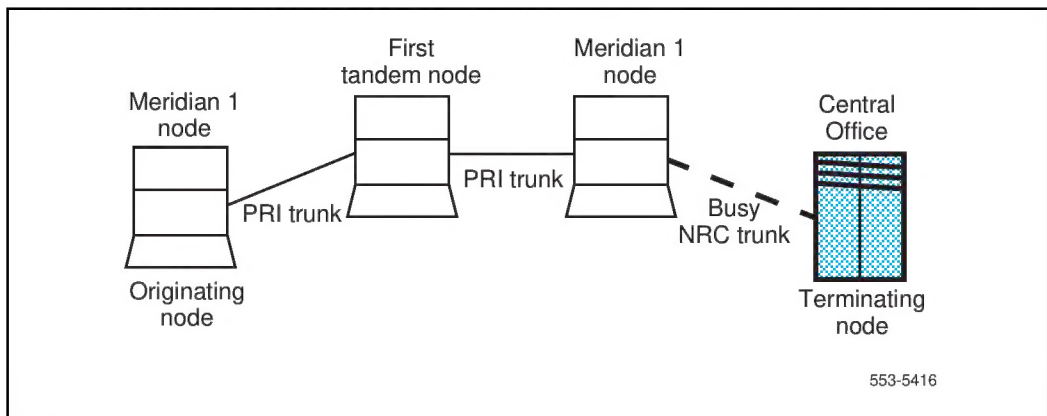
Any trunk other than an ISDN PRI or ISL trunk is considered an NRC trunk. NRC trunks include analog, T1, or public trunks, as well as trunks connecting to a non-Meridian 1, non-ISDN, or non-X11 release 18 node.

When an NRC trunk is busy, RVQ follows this checklist before implementing RVQ:

- The first tandem node must be a Meridian 1 node, with X11 release 18 or later.
- The Network Class of Service (NCOS) of the originating node must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block (NCTL).

Figure 83 shows an RVQ configuration with an NRC trunk.

Figure 83
RVQ configuration example with an NRC trunk



When the checks are complete, activate RVQ by pressing the Ring Again key. As soon as the key is pressed, the retry timer begins. When the retry timer expires, RVQ checks the path again. The total amount of time RVQ will spend on a search is 30 minutes.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets. Only the first NRC trunk is checked. RVQ cannot search beyond that trunk, even if the subsequent trunks are ISDN PRI/ISL.

RVQ on a Conventional Main (RVQCM)

A Conventional Main is any switch that directly connects through tie trunks to an ESN node and is not equipped with ESN network signalling features. When the Conventional Main call enters the ESN node, the NCOS assigned to the incoming tie trunk determines RVQCM eligibility. Use Authcode Conditionally Last to upgrade the NCOS if necessary.

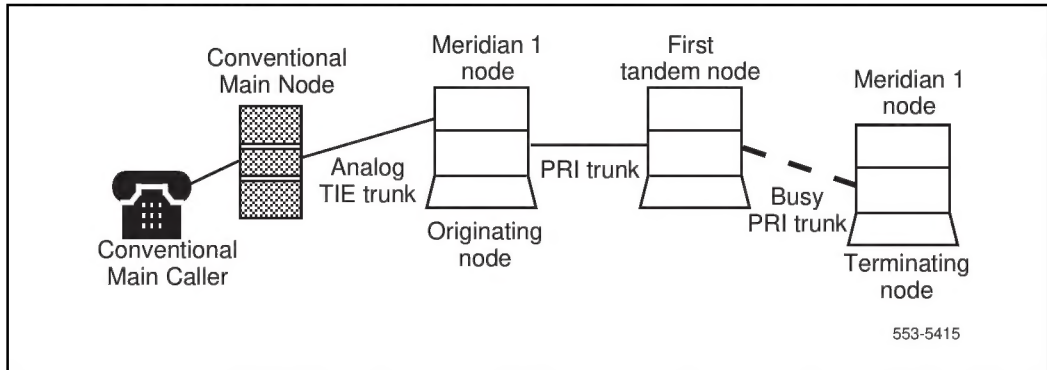
When the Conventional Main call enters the network, the default NCOS is assigned to the tie trunk to determine RVQCM eligibility. Use Authcode Last to upgrade the NCOS if necessary.

When a conventional main call is blocked, RVQ checks the following at the first Meridian 1 node to ensure RVQCM can be activated. The Meridian 1 node is considered the originating node and controls the call.

- The tandem and terminating nodes must be Meridian 1 nodes, running X11 release 18 or later software.
- The Network Class of Service (NCOS) of the incoming tie trunk must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block (NCTL).
- The incoming tie trunk Route Data Block allows CBQ.
- The incoming tie trunk is analog or DTI, but not ISDN PRI.

Figure 84 shows RVQ with a conventional main.

Figure 84
RVQ example with a conventional main



RVQCM is offered to the Conventional Main caller with a special offer tone (three beeps). To accept RVQ, enter the calling number. After the same special confirmation tone (three beeps) is heard, hang up. The originating node begins the retry timer and search process. When the retry timer expires, RVQ checks the path again. The maximum total amount of time RVQ will spend on a search is 30 minutes. When the path is free, the originating node calls the caller back (at the number entered). The phone rings, the same special call back tone (three beeps) is heard, and the call is connected. RVQCM cannot be canceled from the Conventional Main once started.

If the calling telephone is busy, or does not answer the call back, the RVQ call back is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the call back again. If the calling telephone is still busy, or does not answer, RVQ is canceled.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets.

Note: The calling number is accepted only if the database has been configured to accept the given number of digits. If not, or if the caller does not hang up, overflow tone is given, and the call is disconnected. RVQCM does not verify that the dialed DN is valid or free.

Once started, RVQ cannot be canceled from the Conventional Main. Operating parameters relating to Call Back Queuing for Conventional Mains (CBQCM) also apply to RVQCM as follows. Refer to the *Electronic Switched Network description* (309-3001-100) for complete discussions of CBQCM.

Users at Conventional Mains cannot activate Ring Again to refuse expensive routes after the Expensive Route Warning Tone (ERWT) is given.

The node seizes the same tie trunk group that was used to initiate RVQCM for the call back. These trunk groups must be two-way (incoming/outgoing).

Conventional Mains must provide answer supervision on tie trunks connected to the node. These switches must also permit transmission, or repetition of telephone dial pulses for RVQCM operation. This feature cannot be used with systems that operate in senderized mode. Operation may require adjustment of the interdigit timeout on systems that employ simulated cut-through operation.

Multiple call back queues are allowed per trunk group for the Conventional Main by dialing up to seven digits (any digits are allowed) based on the availability of Meridian 1 call registers.

CAUTION

Conventional Mains must not allow RVQCM call back calls to be modified by Call Transfer or Call Forward to an outside line. Call modifications like this can result in the tie trunk not being released at the end of the call.

Operating RVQ from a Meridian digital telephone

The following lists the steps required to activate RVQ from any Meridian digital telephone.

- 1** Place a call to a DN on another node.
- 2** Hear overflow tone (fast busy) indicating a busy trunk along the call path.
- 3** Press the Ring Again (RGA) key. The RGA lamp lights, and the tone stops. If the lamp remains dark, RVQ may not apply.
- 4** Go on hook.
- 5** The RGA lamp fast flashes, and a 1 second buzz indicates the path is available. If you are on another call, you hear the Ring Again tone.
- 6** Go off hook (or press a DN key), and press the RGA key to connect the call. If the RVQ notice is not answered within 16 seconds, the RVQ notice stops, and the request is canceled.

If the terminating telephone is busy, you hear regular busy tone. You can activate Network Ring Again (NRAG) at this point.

Cancel the RVQ request at any time by pressing the RGA key. The associated lamp goes dark.

Operating RVQ from an analog (500/2500 type) telephone

The following lists the steps required to activate RVQ from any analog (500/2500 type) telephone.

- 1** Place a call to a DN on another node.
- 2** Hear overflow tone (fast busy) indicating a busy trunk route along the call path.
- 3** Switchhook flash, and hear special tone (three beeps).
- 4** Dial the Ring Again SPRE or FFC, and hear confirmation tone. If RVQ is not enabled, intercept treatment is given.
- 5** Go on-hook. The RVQ search takes place only when the telephone is idle. RVQ searches only while you are on hook. However, the timer runs while you are on hook, or off hook for a maximum of 30 minutes.
- 6** Special ringing cadence indicates the path is available.
- 7** Go off hook to connect the call. If the RVQ notice is not answered within 16 seconds, the RVQ notice stops, and the request is canceled.

Cancel the RVQ request at any time by going off hook and entering the Ring Again deactivation SPRE or FFC.

Operating RVQCM from a Conventional Main telephone

The following lists the steps required to activate RVQCM from a Conventional Main telephone.

- 1** Place call to a DN on a Meridian 1 node.
- 2** Hear special dial tone (three beeps), or RAN if configured, indicating a busy trunk along the call path.
- 3** Dial the calling DN, and hear the same special tone (three beeps).
- 4** Go on hook.
- 5** The phone rings when the originating node calls back.
- 6** Go off hook, and hear the same special tone (three beeps). Stay off hook, and the call is connected. If the RVQ notice is not answered within the time set in LD87 (CBTL prompt), the RVQ notice stops, and the request is canceled.

RVQ cannot be canceled from a Conventional Main telephone, but may timeout after 20 seconds.

If the calling telephone is busy, or does not answer the call back, the RVQ call back is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the call back again. If the calling telephone is still busy, or does not answer, RVQ is canceled.

Feature packaging

Originator Routing Control/Remote Virtual Queuing (ORG-RVQ) is package 192. It requires the following packages as well. Refer to *X11 features and services* (553-3001-305) for a complete list of package dependencies.

- ISDN Supplementary (ISDNS) package 161
- Main Network Queuing package 38
- Flexible Call Back Queuing package 61
- Digital Trunk Interface package 75
- ISDN signalling package 145
- ISDN PRI package 146 or ISL package 147
- Advanced Network Services package 148 (for NRAG capability)

Feature Implementation

All nodes supporting RVQ must have it enabled. Perform these procedures to configure RVQ on the originating node, and to check for RVQ on the tandem and terminating nodes.

Procedure 52 Use LD 86 to configure originating node for RVQ

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
ROUT	nnn	Route number
...		
IDBB	(DBD) DBI DBA	Enter DBD (Drop Back Busy Disabled). This will disable Drop Back Busy, and enable Remote Virtual Queuing for the customer. DBI = Drop Back if Initial set is busy. DBA = Drop Back if all routes are busy.
...		
CBQ	YES	Allow Call Back Queuing.
...		

Procedure 53**Use LD 87 to configure originating node for CBQ**

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	NCTL	Network Control
...		
SCBQ	YES	Allow systemCall Back queueing for the customer.
NCOS	nn	Network Class of Service number. The originating telephone must have the same value.
...		
CBQ	YES, (NO)	Call Back Queuing allowed (not allowed) for this NCOS
RETT	2–(10)–30	Remote Virtual Queuing Retry Timer (Time between searches, in seconds).
RETC	4–(5)–16	Remote Virtual Queuing Retry Counter (Number of times RVQ searches the initial set before moving on to the extended set).

In LD 86 (Route List Data Block), configure the outgoing routes of the originating nodes for CBQ (at least one entry of the Initial set of the outgoing route has to allow CBQ).

Procedure 54**Use LD 86 to configure outgoing routes of CBQ**

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
ROUT	0-511	Route number
...		
CBQ	YES	Allow Call Back Queuing.
...		
ENTRY	<cr>	
ISSET	nn	Size of Initial set

In LD 16 (Route Data Block), allow CBQ for the incoming non-ISDN routes on the originating nodes (for RVQ at a Conventional Main operation).

Procedure 55**Use LD 16 to allow CBQ for the incoming non-ISDN routes**

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route data block
CUST	0-511	Customer number
ROUT	nnn	Route number
...		
CBQ	YES	Allow Call Back Queuing.
...		

In LD 17 (Configuration Record), configure RVQ on the D-channel.

Procedure 56**Use LD 17 to configure RVQ on the D-channel**

Prompt	Response	Description
REQ	CHG	Change
TYPE	ADAN	Action Device and Number
- ADAN	CHG DCH x	Change D-channel x
...		
- RCAP	RVQ	Remote Capabilities (RVQ is entered for Remote Virtual Queuing.
...		

Originator Routing Control

Originator Routing Control (ORC) has two components: Network Drop Back Busy (DBB) and Network Off Hook Queuing (OHQ). DBB allows network calls that are blocked at a tandem node to be rerouted (dropped back) to the originating node. The calls are then directed over an alternate route. OHQ feature allows off hook queuing to be configured at a tandem node, thereby allowing off hook queuing at that node.

Both DBB and OHQ give the originating node control over the routing of all outgoing network calls.

The DBB and OHQ capabilities are only supported over an ISDN network. With DBB and/or OHQ configured, an ISDN call to a tandem node may encounter the conditions shown in Table 86.

Table 86
DBB/OHQ configurations

Configuration	Condition	Treatment
IDBB = DBI	All routes in initial (I) set busy	Drop back to originating node.
IDBB = DBA	All routes in "I" set and extended (E) set busy	If all routes in "I" set busy, attempt routing over "E" set. If all routes in "E" set are busy, drop back to originating node. This is the default configuration.
IOHQ = YES IDBB = DBI	All routes in "I" set busy	Off-hook queue. If OHQ timer times out, drop back to originating nod.
IOHQ = YES IDBB = DBA	All routes in "I" set and "E" set busy	Off-hook queue to "I" set. When OHQ timer times out, attempt routing over "E" set. If all routes in "E" set are busy, drop back to originating node.

An initial set of routes (I set) are those routes in a route list which have been customer-defined for a node as being inexpensive. The system attempts to complete a call over these routes before testing for queue eligibility. An extended set of routes (E set) are those routes in a route list that are not part of the initial set. These routes are usually designated as expensive. The system attempts to complete a call over these routes only when the initial set queuing times out.

Operating parameters

None.

Feature interactions

Off-hook queuing

Message Intercept

If the Message Intercept feature is equipped, a caller in an off hook queue may receive the message intercept voice response rather than the off hook queuing tone.

Drop Back Busy

Remote Virtual Queuing

Drop Back Busy (DBB) and Remote Virtual Queuing (RVQ) are both packaged under package 192 (ORC/RVQ). If DBB are both configured, DBB will take precedence over RVQ. If the user wishes to activate RVQ, DBB must be disabled for a route entry in response to the IDBB prompt. If the user wishes to activate DBB, it must be enabled by entering DBI or DBA. Refer to “Feature implementation” on page 680 for more information.

Network Attendant Service

Network Attendant Service (NAS) routing takes precedence over DBB.

Feature packaging

Originating Routing Control/Remote Virtual Queuing(ORC-RVQ) package 192 for Drop Back Busy; Off-hook Queuing (OHQ) package 62 for Off-hook Queuing; ISDN Supplementary (ISDNS) package 161; Network Alternate Route Selection (NARS) package 58; Network Attendant Service (NAS) package 159; Network Class of Service (NCOS) package 32; Flexible Call Back Queuing (FCBQ) package 61; Basic Routing (BRTE) package 14; Integrated Services Digital Network (ISDN) package 145; 2.0 Mbit Primary Rate Access (PRI2) package 154 for E-1 applications; and 1.5 Mbit Primary Rate Access (PRA) package 146 for T-1 applications.

Feature implementation

In LD 86 (Route List Data Block), configure the originating nodes for Network Drop Back Busy.

Procedure 57 Use LD 86 for Network Drop Back Busy

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
ROUT	nnn	Route number
...	...	...
IDBB		Enter DBI or DBA.
		Enter DBD to enable Remote Virtual Queuing..
	DBI	DBI = Drop Back if Initial set is busy.
	DBA	DBA = Drop Back if all routes are busy.
	(DBD	DBD = Drop Back Busy disabled.
IOHQ	YES, NO	YES = allow Network Off-hook queuing NO = disable Network Off-hook queuing

In LD 87 (Network Control Block), configure the nodes for OHQ (if required).

Procedure 58**Use LD 87 to configure OHQ nodes**

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	NCTL	NetworkControl Block
SOHQ	YES	Allow system (customer) Off-hook queuing.
OHTL	nn	Off-hook queue time limit.
...		
NCOS	nn	Network Class of Service number. The originating telephone must have the same value.
...		
OHQ	YES	Allow Off Hook Queueing allowed for this NCOS
...		

In LD 16 (Route Data Block), configure the network routes NCOS (if OHQ required).

Procedure 59
Use LD 16 to configure NCOS routes

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route datablock
CUST	nn	Customer number
ROUT	nnn	Route number
...		
SIGO	ESN2 ESN3 ESN5	NCOS type support
...		

In LD 86 (Route List Data Block), configure the tandem nodes for OHQ (if required).

Procedure 60**Use LD 86 to configure OHQ tandem nodes**

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
ROUT	nnn	Route number
...	...	...
OHQ	YES	Allow OHQ
...		
ENTRY	<cr>	
ISSET	nn	Size of Initial set

In LD 16 (Route Data Block), configure the tandem nodes for OHQ (if required).

Procedure 61

Use LD 16 to configure OHQ tandem nodes

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route datablock
CUST	nn	Customer number
ROUT	nnn	Route number
...		
OHQ	YES	Allow OHQ.
...		
